I pass now to the neighbourhood of the St. Gothard. The coarse gneiss, which is pierced by the northern entrance of the great tunnel, ends abruptly at the Urnerloch. The basin of the Urserenthal is excavated from satiny slates, with dark limestones, very possibly of Jurassic age, and from some underlying rather variable schists. The first rock visible on the eastern side as we approach Andermatt is a schistose crystalline limestone, associated with mica schists; and a series of rather variable schists, evidently very different from the coarse gneisses of the gorge below, appears to cross the valley, and form the slopes leading to the Oberalp Pass. These may be traced for some distance up the Furka road above Realp, when they are abruptly succeeded by the slaty group mentioned above. I am convinced that they are much more ancient than the latter, being probably members of the Lustrous Schist group, if not older. It is obvious that the newer rocks are only a fragment of a loop of a huge fold, over which on either hand the fragments of the enveloping older metamorphic rocks tower up in mountain peaks. On the ascent of the St. Gothard Pass from Hospenthal a series of somewhat variable micaceous schists continues till the top of the first step in the ascent is reached, about 800 feet above the valley, when gneiss sets in, generally rather coarse and sometimes very porphyritic, occasionally interbanded with dark, rather friable mica schists. The upper plateau of the pass consists of a porphyritic rock, often called granite, but with a gneissose aspect and rather more friable in character than the rock of the Wasen district. On the first steep descent on the south side this rock appears to pass into a normal coarse gneiss, occasionally banded with mica schist, resembling that in a similar position on the northern flank, which is succeeded for a short space by a remarkably well-banded gneiss. To this succeeds—it must be remembered that the series is inverted in order—the great group of hornblendic and garnetiferous mica schists, which continue along the Val Tremola and the lower slopes of the mountain to the neighbourhood of Airolo, where some calcareous rock occurs, being probably an infold of much later date.

Through the kindness of Mr. Fletcher and Mr. Davis, of the British Museum, I have been allowed to examine the series of specimens from the St. Gothard Tunnel in that collection. They correspond in general with the succession above indicated, except that I have failed to identify the granitoid rock of the summit plateau. Leaving, however, for a moment the question of correlation, we see that the St. Gothard section presents us with an instance of folding on a gigantic scale, and of the fan structure, doubtless with many minor flexures and faults.

In the neighbourhood of the Val Piora we get an important succession. The ascent to the hotel from the Val Bedretto passes in the main over a series of micaceous schists and rather friable gneisses, which are a prolongation of an axis exposed in the mountains south of Airolo and fairly correspond with much of the rock (excepting the granitoid) forming the upper part of the St. Gothard Pass. To this succeeds a series which, though more calcareous, clearly represents the garnetiferous actinolitic series of the southern slopes, and to this a group closely resembling the Lustrous Schists.

(*To be continued.*)

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Electors to the Professorship of Pathology will meet for the purpose of electing a Professor on May 24. The stipend of the Professor is 800*l.* a year, exclusive of fees, but he must not engage in the private practice of Medicine or Surgery.

Prof. Macalister lectures to-day on the Race Types of the Human Skull; on Saturday, on the Race Variations of the Skin, Hair, and Soft Parts; and on Tuesday, the 13th, on the Anatomical Characters of the Prehistoric and Early Historic Races of Britain: on each day at 1 p.m.

In the Long Vacation Prof. Macalister will take a Class in Osteology, and the Demonstrator will have a class for Practical Histology.

The new buildings for Prof. Stuart's Museum of Mechanism will be ready to receive their contents this term, and it is recommended that the buildings to provide for the Department of Botany be at once proceeded with, to be ready for use at the beginning of October.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 1.—"On the Connection of the Himalaya Snowfall with Dry Winds and Seasons of Drought in India." By Henry F. Blanford, F.R.S.

In this paper the author points out that for some years past it has been suspected that the snowfall of the Himalaya has a direct influence on the dry land winds of North-Western India. The connection of the two was first noticed in 1876 and 1877, the first-named a year of drought and famine in Southern India, the second the same in the North-Western Provinces, Rajputana, and Central India. Messrs. Hill and Archibald, about the same time, called attention to the circumstance that excessive winter rainfall in Northern India is usually followed by defective rains in the summer or monsoon season. This inference is strengthened if the rainfall of May be included in that of the winter and spring instead of in that of the summer, as is shown by a table for the eighteen years from 1864 to 1881 inclusive. Fourteen of these years give results agreeing with Messrs. Hill and Archibald's views, and only four differ from their conclusions: two out of these four, viz. 1876 and 1880, being found on further investigation distinctly to confirm the theory, whilst data are wanting with regard to the other two years.

After some details concerning the meteorology of the area in the years 1881–82, the writer gives a description of the unusual snowfall on the outer ranges of the Himalaya in the spring of 1883, and of the extensive drought in Northern, North-Western, and part of Central India that followed. In this instance a warning forecast of dry weather and retarded rainfall was published in the *Gazette of India* on June 2, and this forecast is shown to have been justified by the event, the rainfall in July and August over large portions of India having been much below the average.

In an account of the meteorology of the land winds it is shown that from November to February they tend to circulate anticyclonically round the axis of maximum pressure, extending from the Punjab and Sind across Rajputana and Central India towards Orissa. In March a barometric minimum is established over the Hyderabad plateau, and this extends to the north and north-east, the wind currents becoming cyclonic around the depression. To the eastward of this area some rain falls in the spring, but Western India from Belgaum to the Punjab is practically rainless from November till May, and is the dry wind area. It is then shown that the supply of air for the dry wind is derived from an upper stratum by convective interchange. After rain and snow on the Himalayas the dry winds are supplemented by an outflow of cold air from the hills accompanied by a wave of high pressure advancing eastward from the valley of the Indus.

The following summary and conclusions are given:—

(1.) The experience of recent years affords many instances of an unusually heavy and especially a late fall of snow on the North-Western Himalaya being followed by a prolonged period of drought on the plains of North-Western and Western India.

(2.) On tabulating the average rainfall of the winter and spring months at the stations of the North-Western Himalaya, year by year, for the last eighteen years, and comparing it with the average rainfall of the North-Western Provinces in the ensuing summer monsoon, it is found that with four exceptions an excessive winter precipitation on the hills is followed by a deficient summer rainfall on the plains, and *vice versâ*. Of the four apparent exceptions, two are found to afford a striking support to the first proposition.

(3.) The west winds which, in Western and Northern India, are characteristic of seasons of drought as abnormal winds, are identical in character with the normal winds of the dry season, and appear to be fed by descending currents from the North-Western Himalaya, and possibly the western mountains generally.

(4.) It is a common and well-known phenomenon of the winter months that a fall of rain and snow on the North-Western Himalaya is immediately followed by a wave of high pressure advancing eastwards from the western mountains, accompanied with dry cool north-west winds.

(5.) The conclusion is that an unusual expanse of snow on the North-Western Himalaya, whether due to the unmelted residue of an unusually copious winter snowfall, or to an unusually late fall in the spring months, acts, at high levels, in the summer months, in somewhat the same way as the ordinary falls of snow and rain on the Lower Himalaya do at low levels in the winter season, and favour the production of dry north-west winds on the plains of Western India.

(6.) That this dependence of dry winds on the Himalayan snowfall affords a criterion for forecasting the probabilities of drought in North-Western and Western India.

In setting forth the above conclusions, it is, however, necessary not to ignore the fact that there are other conditions besides those here considered which exercise a very great influence on the prevalence of dry winds and drought. During the last famine period in India (the years 1876 and 1877; in the former year in Southern India, in the latter in the North-Western Provinces and Rajputana), the pressure of the atmosphere was persistently and abnormally high, and this was due, as I showed in the reports on the meteorology of those years, to the condition, probably the high density, of the higher atmospheric strata. Moreover, this excessive pressure was shown to affect so extensive a region that it would be unreasonable to attribute it to the condition of any tract so limited as a portion of the Himalayan chain; and if dependent on the thermal conditions of the surface, which may indeed have been the case, this land must rather have been the major portion of the Asiatic continent than merely a relatively small portion of its mountain axis. This question must remain for future inquiry. It is referred to here to guard against too wide an application being assigned to the action of the Himalayan snows.

Physical Society, April 26.—Dr. Guthrie, president, in the chair.—New Members: Mr. Chattock, Mr. Inwards.—Profs. Perry and Ayrton read a paper on the indicator diagram of a gas-engine, which was intended to teach practical engineers a new method of studying gas-engine diagrams. The most recent results obtained by the use of Dowson gas were stated, and it was suggested that before long gas-engines will be employed for the propulsion of ships. A large wooden model of an Otto gas-engine enabled the operations going on during a cycle of the engine to be understood. Tables were given of the constituents of coal-gas and Dowson gas, the air required for combustion, the heat of combustion, and the specific heats, to enable the characteristic equation of the fluid used in the gas-engine to be determined. An easy method of obtaining one empirical formula to represent all the diagrams which can be obtained from an engine with different quantities of gas was described and its results compared with observation. The effects of vibration of the indicator spring in the various parts of the diagram were discussed, as well as the effect of the last explosion, which are provided for in the empirical formula. Three practical methods of determining the rate, q, of gain of heat by the fluid during the forward stroke were given, and a diagram was shown in which this rate could everywhere be compared with the rate of doing work. If W is the indicated work in one cycle, it was shown that 5·64 W is the total energy of combustion of one charge, and this is expended as follows:—1·45 W is the work done in the forward stroke, 2·22 W is given to the cylinder by radiation in the forward stroke, 1·5 W is carried off through the exhaust-pipe, 0·47 W is given to the cylinder as heat after exhaust-valve opens. The rate at which the loss, 2·22 W., by radiation occurs at every point of the forward stroke was shown on a diagram obtained from a knowledge of the temperature at every point in the stroke, and when the ordinates of this diagram were added to the q diagram previously described, a diagram was obtained showing at every point of the stroke the rate at which combustion was going on. This diagram was specially important as showing the effect of dissociation in the gas-engine.—Dr. W. H. Stone exhibited a simple form of siphon mercurial barometer with metrical scale. Two millimetre scales are adjusted to slide easily side by side; the lower edge of one is brought on a level with the mercury in the shorter limb, and the other slid up and down until its lower edge coincides with the upper mercury surface. The adjustment is easily effected by an observer without stooping by the use of two right-angled glass prisms fitting on the upper and lower ends of a vertical glass tube.—The next meeting of the Society, on May 10, will be held in the Mason College, Birmingham.

Anthropological Institute, April 22.—Prof. Flower, F.R.S., president, in the chair.—The President, in welcoming the Members to their new quarters, gave an outline of the history of the Society and of the eminent men who have presided over it during the forty years of its existence. The Ethnological Society, founded in 1843, and the Anthropological Society twenty years later, were united in 1871 under the title, "The Anthropological Institute of Great Britain and Ireland."—The Marquis of Lorne sent to express his regret at his inability to attend; he exhibited a large collection of North American objects, including a scalp taken last summer.—Sir Richard Owen communicated a paper on a portrait of an aboriginal Tasmanian. The paper was further illustrated by two busts and several portraits belonging to the Institute.—Prof. Keane then read a paper on the ethnology of the Egyptian Soudan, which was described as a region of extreme complexity, a converging point of all the great races of the African Continent, except the Hottentot and Bushman. Although official documents such as Col. Stewart's "Report on the Soudan" for 1883, recognised only "two main divisions, Arab and Negro," it was shown that here was represented the Hamites, Semites, Nubians, Negroes, and Bantus. Of the Hamites, the chief branches were the Tibbu in Darfur, and the Ethiopians stretching east of the Nile without interruption from Egypt to the Equator, and including the Galla and Somali south of Abyssinia, various tribes between Abyssinia and the coast, and the Bejas, who occupied the greater part of the Nubian Desert between Abyssinia and Egypt. The Bejas, whose very existence was ignored by our officials, and who were universally confounded by newspaper correspondents with the Arabs, were the true aboriginal element in the country between Berber and Suakim, where they recently came into collision with the British forces.

Royal Microscopical Society, April 9.—The Rev. W. H. Dallinger, F.R.S., president, in the chair.—On the motion of the President a vote of condolence with the R. Accademia dei Lincei on the death of their president, Quintino Sella (an *ex-officio* Fellow of the Society) was passed.—Dr. Carpenter, C.B., explained in detail his reasons for considering that binocular vision in the microscope took place on the same principles as in the case of ordinary vision, and combated Prof. Abbe's view to the contrary. A number of photographs, diagrams, and models were exhibited in illustration. Mr. Crisp gave his reasons for considering that Prof. Abbe was right. In ordinary vision we had a perspective shortening of parts of the object, but under the microscope this did not occur. In ordinary vision a lined object would show the lines closer together when viewed obliquely, whilst under the microscope the lines appeared the same distance apart whether they were viewed by the central or oblique pencils.—Mr. Bolton exhibited the interesting Rhizopod, *Clathrulina elegans*, from Epping Forest, which had been found to exhibit a fourth mode of reproduction by the formation of flagellate monads.—Mr. Guimaraens described a true *Xanthidium* from Halifax coal strata.—Mr. Badcock read a note on certain filaments which he had observed protruding from *Surirella bifrons*.—Mr. Nelson explained the method which he had found most suitable for examining certain bacteria.—The President announced that the next meeting would be made special, to consider the question of the admission of ladies as members of the Society.

PARIS

Academy of Sciences, April 28.—M. Rolland in the chair.—Observations extracted from M. Verbeek's report on the Krakatoa eruption of August 26, 27, and 28, 1883, by M. Daubrée.—Note on the problem to determine the degree of all algebraic surfaces which may be osculatory with another surface, by M. de Jonquières.—On an extension of the law of Harriot relating to algebraic equations, by Prof. Sylvester.—Memoir on the conservation of stellar energies, and on the variation of terrestrial temperatures, with a table showing the probable succession of the approximate dates of maximum and minimum intensity of solar radiation, by M. Duponchel.—On the absolute standard of light, by M. J. Violle. In this paper the author develops the idea already formulated by him at the International Congress of Electricians in 1881, the essential object of which was to verify the principle of the method, which consists in taking as a standard of light a metal at its point of fusion. He now finds that platinum best fulfils the conditions required of an absolute standard of light. It rests on a perfectly defined and constant physical phenomenon, and constitutes a practical term of comparison with ordinary standards.—Results of a series of experiments undertaken to determine the dimensions of the column of mercury at zero which represents the unity of practical resistance, or the value of the ohm, by MM. E. Mascart, F. de Nerville, and R. Benoit.—Note on the application of the laws of induction to the helio-electric theory of the perturbations of terrestrial magnetism, by M. Quet. From his own observations, as well as those of Carrington, Armstrong, and others, the author infers a definite relation between the sunspots and terrestrial magnetic disturbances.—On the apparent resistance of the voltaic arc usually employed in lighthouses, by M. F. Lucas.—Some results of repeated experiments conducted at the School of Telegraphy on telluric electric currents, by M. E. E. Blavier.—Description of a method for directly determining the cause of the deficit in dynamo-electric machines, by M. G. Cabanellas.—On the freezing point of the salts of biatomic metals, by M. F. M. Raoult. This paper is accompanied by tables of results for a large number of biatomic metals.—On the formation of amides in separating sal ammoniacs from organic acids, by M. N. Menschutkin.—On a glucoside yielded by the Boldo (*Boldoa fragrans*), by M. P. Chapoteaut.—Researches on water-tight substances; influence of baking and carbonic acid on the induration of siliceous cements, by M. Ed. Landrin.—On the presence of manganese in wines and a large number of other vegetable and animal products, by M. E. J. Maumené. An appreciable proportion of manganese was found in thirty-four wines tested by the author, who infers that it exists in all wines, as well as in wheat, rye, and many other substances.—Note on the assimilating properties of the phosphoric acid contained in rocks and in arable lands, by M. G. Lechartier.—Experimental method of determining the physiological combustibility of various substances, with tabulated results, by M. Schützenberger.—Researches on the respiration of plants in the dark, by MM. G. Bonnier and L. Mangin.—Further remarks on the zeolites associated with the dolerites of the Chaux-de-Bergonne district, Puy-de-Dôme, by M. F. Gonnard.—Special distribution and localisation of the motor roots in the lumbo-sacral plexus, by MM. Forgue and Lannegrace.—Geological section of the shaft sunk to a depth of 502·50 metres at Montrond, Loire, presented by M. Laur. At this depth a sheet of mineral water was reached, accompanied by much carbonic acid, which was ejected to a height of 35 metres above the surface.

BERLIN

Physiological Society, March 28.—Dr. Cohnstein communicated observations he had made on rabbits and dogs regarding the nature of the blood of fœtuses and new-born animals. He first counted the number of blood-corpuscles in a cubic millimetre of blood, and found that throughout the whole course of the fœtal intra-uterine state they increased progressively with the age of the embryo, but yet never attained to the number present in the mother's blood. After birth, however, the relative numbers of the two were reversed. The number of blood-corpuscles in the blood of the young one exceeded that in the blood of the mother. The blood of the new-born animal was accordingly thicker than that both of the fœtus and of the mother. Dr. Cohnstein measured the total blood mass in the unborn and new-born young according to a method he communicated in greater detail; and though the results he obtained were very variable, he never found the same relative differences therein as applied to the quantity of blood-corpuscles. The proportion of hæmoglobin of the embryo blood was precisely calculated, and on the whole showed the same variations as the number of blood-cells; yet the increase of hæmoglobin after birth was not so great as that of the number of blood-corpuscles.—In connection with the foregoing statements of Dr. Cohnstein, Prof. Zuntz brought forward his experiments on the subject of the mechanics of the blood-circulation in unborn animals, after describing at full length the apparatus and methods he had employed in this investigation. The results of his observations, carried out mostly on the umbilical vessels, were as follows:—The blood-pressure in the navel artery amounted on an average to about 40 mm. mercury; in the navel vein it showed considerable variations, limited, however, to between 16 and 30 mm. mercury; values very considerably surpassing the normal pressure in the *vena cava inferior* in the case of the full-grown, but which were very simply explained by the fact that the blood in the placenta suffered only very slight resistance. The rate of movement of the blood was considerably less in the fœtus than in the mother. Especially interesting were the results of the analyses of the blood gases, performed in accordance with methods indicated in the address. It was first shown that the blood of the unborn, when kept for some time in a closed vessel, had its proportion of oxygen very quickly reduced, that is to say, the consumption of oxygen on the part of the fœtal blood was very copious and considerably greater than after birth or in the case of the full-grown. This fact was shown by the very appearance of the blood, the bright red blood taken from the navel artery turning dark very rapidly. The proportion of carbonic acid in the blood in the navel artery was about 4½ per cent. higher than in the navel vein, while in the case of the full-grown the difference between arterial and venous blood amounted on an average, as was well known, to 9 per cent. The proportion of oxygen in the fœtal blood was very changing. In the navel artery it averaged about 4 per cent. less than in the navel vein; but even in this latter case the blood was by no means saturated with oxygen. From the gaseous contents of the blood and its circulation an interesting glance was thus obtained into the respiratory process of the unborn.—Dr. Kossel announced that he had succeeded in demonstrating the presence of peptonous bodies in tissue. If the granule-holding blood-cells of birds were treated with water, there remained a loose, flaky mass which shrunk together on the application of hydrochloric acid; the main constituent of the flaky mass was nuclein, and by the acid another substance was freed, which on analysis proved to be a peptonous substance. The circumstance that this peptonous body, which was soluble in water, was not extracted on the first treatment with water, showed that in the blood-corpuscles it was chemically combined with nuclein. A remarkable property was displayed by this peptonous body when treated with ammonia; it became precipitated as coagulable albumen. Such a transformation of a peptone into coagulable albumen was hitherto known only as an effect of high temperature. That it could be effected in such a simple manner Dr. Kossel regarded as a confirmation of his view that peptone was distinguished from albumen by a higher proportion of water.—Herr Aronsohn spoke of his experiments with a view to electric irritation of the olfactory nerves. The nose having been filled with a very weak warm solution of common salt, one electrode, a platinum wire inside a glass tube, was brought close to the olfactory nerve, and the other was directed to the hand or the neck. A constant current of the strength of ·0001 ampere now excited in each case, according to its direction, either on opening or on closing, a quite decided sensation of smell which could be compared with no known scent, not even with that of phosphor or ozone. Now and again, too, a sense of taste was excited at the same time. The direction of the current had no influence on the quality of the olfactory sensation. The appearance of the irritation on closing or opening the constant current corresponded completely with Pflüger's law of spasms (*Zuckungogesetz*).

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